

In the claims

1. (currently amended) An off-axis illumination (OAI) photomask for OAI semiconductor photolithography processing comprising:
a transparent substrate;
an opaque non-dense contact that is isolated and/or random; and,
a plurality of opaque assist features situated near and around the non-dense contact, each assist feature having a size smaller than a size of the non-dense contact,
the plurality of assist features improving at least one of depth of field (DOF) and resolution of the semiconductor photolithography processing.
2. (original) The photomask of claim 1, wherein the plurality of assist features consists of at least six and less than twelve assist features.
3. (original) The photomask of claim 1, wherein the plurality of assist features consists of eight assist features.
4. (original) The photomask of claim 1, wherein the plurality of assist features are situated in a symmetrical pattern near and around the non-dense contact, each assist feature equally distant from the non-dense contact.
5. (original) The photomask of claim 1, wherein the size of each assist feature is between twenty and eighty percent of the size of the non-dense contact.
6. (original) The photomask of claim 1, wherein the plurality of assist features are at least substantially identical to one another.

Filed 3/1/2002
Attorney docket no. 67,200-523

7. (original) The photomask of claim 1, wherein each assist feature has a shape at least substantially similar to a shape of the non-dense contact.
8. (original) The photomask of claim 1, wherein the non-dense contact is an isolated contact.
9. (original) The photomask of claim 1, wherein the non-dense contact is a random contact.
10. (currently amended) The photomask of claim 1, wherein the non-dense contact is ~~a semi-dense contact both isolated and random~~.
11. (currently amended) A method for producing an off-axis illumination (OAI) photomask comprising:
 - creating a non-dense opaque contact on a transparent substrate of the photomask, the non-dense opaque contact being isolated and/or random; and,
 - creating a plurality of substantially identical opaque assist features situated in at least a substantially regular pattern around the non-dense contact, each assist feature having a size smaller than a size of the non-dense contact,
 - such that the plurality of assist features allow the non-dense contact to at least more closely mimic a dense contact during ~~off axis illumination (OAI)~~.
12. (original) The method of claim 11, wherein the plurality of assist features consists of at least six and less than twelve assist features.
13. (original) The method of claim 11, wherein the size of each assist feature is between twenty and eighty percent of the size of the non-dense contact.

14. (original) The method of claim 11, wherein each assist feature has a shape at least substantially similar to a shape of the non-dense contact.

15. (currently amended) The method of claim 11, wherein the non-dense contact is one or more of: an isolated contact, a random contact, and ~~a semi-dense contact both isolated and random.~~

16. (currently amended) A semiconductor device formed at least in part by a method comprising:

positioning a photomask over a semiconductor wafer having a top layer of photoresist, the photomask having a plurality of substantially identical opaque assist features situated in at least a substantially regular pattern around a non-dense opaque contact on a transparent substrate, each assist feature having a size smaller than a size of the non-dense contact, the non-dense contact being isolated and/or random;

exposing the semiconductor wafer through the photomask positioned thereover via off-axis illumination (OAI), such that the top layer of photoresist includes exposed parts under clear parts of the photomask and unexposed parts under opaque parts of the photomask;

developing the semiconductor wafer to remove the exposed parts of the top layer of photoresist;

etching the semiconductor wafer where the wafer is revealed through the exposed parts of the top layer of photoresist that has been removed; and,

removing the unexposed parts of the top layer of photoresist.

17. (original) The semiconductor device of claim 16, wherein the plurality of assist features consists of at least six and less than twelve assist features.

Filed 3/1/2002
Attorney docket no. 67,200-523

18. (original) The semiconductor device of claim 16, wherein the size of each assist feature is between twenty and eighty percent of the size of the non-dense contact.

19. (original) The semiconductor device of claim 16, wherein each assist feature has a shape at least substantially similar to a shape of the non-dense contact.

20. (currently amended) The semiconductor device of claim 16, wherein the non-dense contact is one or more of: an isolated contact, a random contact, and ~~a semi-dense contact both isolated and random~~.